framework for studying access to health care. ED visits were classified into avoidable or not using the New York University algorithm. Patient complexity was measured using the Chronic Illness Intensity Index (CI3), an index used to measure need of case management intensity. We performed logistic regression models to test for significant association between AEDV, and population at risk and health care delivery characteristics. **RESULTS:** We found that 69% (179) of our population had an ED visits during 2008-2009. Of these visits, 60% were classified as AEDV. The analysis showed that women were 33% less likely to have an AEDV per month. Age was negatively associated, with younger patients being more likely to have AEDV. More complex patients were 6.6% more likely to have an AEDV. For every extra physician a patient visited, the probability of having an AEDV per month increased by 2.4%, however this was not significant ($p = 0.06$) at 95% confidence interval. **CONCLUSIONS:** Among high cost, high risk Medicaid patients there are certain patient characteristics that can allow us to identify those at higher risk of having an AEDV. This information could be use to identify groups that would benefit from interventions to reduce ED utilization.

PHP55

A REVIEW OF THE NICE APPEALS PROCESS

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OBJECTIVES: Formal systems of health technology appraisal (HTA) can directly inform resource allocation in healthcare systems and have contributed to the equitable and efficient allocation of such resources. To engender and maintain support from a wide range of stakeholders it is important that HTA systems are seen a socially just, particularly in the face of contentious decisions. Effective appeals processes, internal or judicial, can have an important role in meeting this goal, enabling stakeholders to directly question the evidence considered, its interpretation, and the decision making process. We conducted an empirical review of the results of all appeals made to the National Institute for Clinical Excellence (NICE) between the years 2000 and 2010, and consider whether NICE fulfills these requirements. **METHODS:** A retrospective review of all completed NICE technology appraisals published between March 2000 and October 2010 was conducted. Each technology appraisal was investigated for appeals. Published appeals were then categorized by appeal substance, stakeholder, and outcome. The results were presented as absolute numbers and proportions of overall responses. **RESULTS:** In this study 29% of appraisals resulted in a published appeal of which 41% were upheld. The most common ground for an appeal, 59% of total, was perversity of the decision, the main substance for those appeals was misinterpretation of the clinical or cost-effectiveness evidence. By proportion of appeals upheld the most successful appeal point was that the HTA did not meet the scope or was deemed to be inequitable. Appeals involving a professional body or patient group were also more likely to be successful. **CONCLUSIONS:** Examination of appeals to NICE would suggest that a socially just and effective appeals process is in place. Decisions are reversible and transparent and stakeholders can both participate in and question the decision process.

Health Care Use & Policy Studies – Formulary Development

PHP56

THE EMERGENT ROLE OF THE SPECIALIST PHARMACIST AS AN IMPORTANT STAKEHOLDER IN MARKET ACCESS

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OBJECTIVES: Over the last decade, specialist pharmacists across Europe have seen an emergent role in many areas of the healthcare pathway. This research examined four key domains - clinical, policy, education and research - of influence of specialist pharmacists with goal of understanding how they can impact market access of drugs. **METHODS:** Structured interviews with 25 specialist oncology pharmacists from EU5 exploring various aspects within the four identified domains of influence. **RESULTS:** A selection of the most important roles of the specialist pharmacist by domain is presented below: Clinical: 1) Coordinate safe and timely administration of drugs and supportive treatment; 2) Coordinate outpatient supportive care focusing on management of symptoms; and 3) Help develop treatment guidelines to ensure optimal use of supportive care medications. Policy: 1) Provide formulary review for new drugs, and 2) Facilitate reimbursement for a more efficient practice. Education: 1) Educate patients and members of the HC team about drugs and their expected side effects and management, and 2) Educate members of the public about prevention strategies and recommendation for screening and early detection. Research: 1) Conduct internal treatment protocol audits to optimise patient care pathway, and 2) Participate in institutional review board for approval of clinical trials as well as scientific review and monitoring committees. **CONCLUSIONS:** A cornerstone of market access is identification of important stakeholders within a health care economy with the goal of understanding the roles they play in the care pathway. The specialist pharmacist is an often overlooked, but increasingly important stakeholder in the European health care system. The multitude of roles played by the specialist pharmacist is in itself evidence of increasing importance of the role. Pharmaceutical companies will need to engage more closely with specialist pharmacists to ensure better patient outcomes through appropriate use of drugs leading ultimately to increased market access.

PHP57

CENTRALIZED DRUG ASSESSMENT IN CATALONIA: WHERE WE HAVE GONE SO FAR?

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OBJECTIVES: The Committee for the Assessment of Hospital Drugs, led by the Catalan Agency of Health Information Assessment and Quality, has provided evidence-based information to regional health care decision-makers in Catalonia about the added therapeutic value (ATV) of centralized approved drugs fit into the orphan or advanced therapies category or have conditional approval or were approved in exceptional circumstances. This study describes the committee's activity since its creation. **METHODS:** Systematic reviews of efficacy, safety and cost-effectiveness are conducted upon request from the Pharmacy Directorate and results are appraised by expert panels. **RESULTS:** A total of 22 drugs (24 indications) for an estimated population of 1.100 patients have been assessed. Most drugs were granted approval for two major therapeutic areas: onco/hematological (41%) and metabolic diseases (32%). Orphan designation had been given to 70% of all indications. Only 8 indications were given positive opinion based on 2 clinical trials. Most pivotal studies were randomized phase III trials and were considered to have moderate (63%) to high (25%) risk of bias. Placebo was the most frequent comparator in controlled studies but was only considered appropriate in half. Primary endpoint was a surrogate/intermediate endpoint in 94% of studies. Relevance of efficacy results was difficult to interpret due to design flaws, small samples and short-term follow-ups. Scarce or no data on effectiveness was available. Information on comparative safety was also scant and limited by short-term follow-ups. At time of assessment cost-effectiveness data was missing in 66% of the indications. Reported base-case incremental cost-effectiveness ratios from manufacturers ranged from 16.000-565.000€/QALY. **CONCLUSIONS:** Defining ATV of new entities at the time of introduction proved a challenge because of low quality studies and lack of information about relative effectiveness. Registers and/or risk-sharing schemes may be an alternative to gather more information new about drugs and establish their real ATV while facilitating access.

Health Care Use & Policy Studies – Health Care Costs & Management

PHP58

TOWARDS COST-EFFECTIVENESS ANALYSIS OF THE HEALTH AND WELLBEING BENEFITS OF URBAN GREEN SPACE: A MAPPING REVIEW

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OBJECTIVES: Urban green spaces (UGS) are thought to impact on health and wellbeing. Cost-effectiveness analysis (CEA) can help to determine if provision or interventional use of urban green spaces can contribute to population health in a cost effective manner. This mapping review aims to characterise the study designs, independent variables, outcomes and outcome measures reported in the literature. **METHODS:** Key health and medical databases were searched. Studies of any design (except reviews) which attempted to value the health and wellbeing effects of UGS were included. One reviewer selected studies with a proportion checked by a second and third reviewer. Data were extracted from abstracts using a standardised form. Data were coded using a grounded theory approach and synthesised in graphical and tabular form. **RESULTS:** A total of 189 citations were included. The most common study design was cross sectional regression analyses; there were only three randomised controlled trials. Many putative independent variables were identified, including psychological, socio-economic, environmental and interventional variables. Settings and populations also varied. Outcomes coded as health behaviours included physical activity, visit frequency, nutrition and social interaction; those coded as health outcomes included general health, mental health, quality of life, wellbeing, mortality, obesity and cardiovascular indices amongst others. Outcome measures were generally not compatible with CEA. Amongst 61 economic studies, the most common study type was hedonic pricing. Only one limited CEA analysis was identified. **CONCLUSIONS:** Few randomised studies have been performed and available evidence would not allow a traditional CEA. Existing trials have limited external validity according to criteria normally used in health contexts. Current evidence may better lend itself to logic modelling, as the causal pathways are long and complex and green space is likely to act at both the individual and population level. To aid CEA, future research should carefully choose study design, outcomes and outcome measures.

PHP59

ESTIMATION OF INCREASES IN DIRECT MEDICAL EXPENDITURES ASSOCIATED WITH MEDICATION NONADHERENCE AND POTENTIAL SAVINGS FROM INCREASED ADHERENCE

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OBJECTIVES: We estimated increases in medical expenditures due to medication nonadherence and potential savings of increasing adherence for members of a prescription-drug benefit plan taking medications in four drug therapy classes (TCs). **METHODS:** We used data from the Medical Expenditure Panel Survey (MEPS) to estimate functional relationships between adherence and resource utilization for patients taking medications in four TCs. Resource use included all-cause and disease-specific annual hospitalizations and emergency room (ER) visits. TCs included depression, diabetes, high blood cholesterol (cholesterol), and high blood pressure or heart disease (heart). Adherence was estimated using the medication possession ratio (MPR). MPR less than 80% was considered nonadherence. Average medication expenditures, by TC, was obtained from a large prescription-drug database. Expenditures per hospitalization and ER visit were estimated from MEPS. Unit costs and functional relationships between adherence and resource use were applied to estimate annual resource use and medication expenditure. Increased expenditures due to nonadherence were estimated for nonadherent patients ver-

sus those with 80% adherence. Total expenditures considered expenditures from inpatient admissions, ER visits, and medications. Potential savings was defined as reduction in total expenditures due to increasing adherence. **RESULTS:** Nonadherence resulted in increased all-cause total expenditures in diabetes, cholesterol, and heart by $240 million (M), $150M, and $47M, respectively. Increasing adherence by 2% reduced increases in all-cause expenditure by 11% to 21%. Nonadherence resulted in increased disease-specific hospitalization and ER visit expenditure for depression ($6M), diabetes ($44M), and cholesterol ($5M). However, increases in the disease-specific hospitalization and ER expenditures were offset by lower medication expenditure, thus resulting in overall lower disease-specific expenditure among the nonadherent patients. Overall, increases in medication adherence resulted in savings in all-cause expenditure but not in disease-specific expenditure. **CONCLUSIONS:** Medication nonadherence can be costly to payers. Increasing adherence even by small amounts may result in significant savings.

PHP60

DRUG-RELATED MORBIDITY – MODELING THE COST-OF-ILLNESS IN SWEDEN USING PHARMACISTS' OPINION

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OBJECTIVES: The aim of this study was to estimate prevalence and preventability of drug-related morbidity in Sweden based on pharmacists' expert opinion. Furthermore, the aim was to estimate the cost-of-illness (COI) of drug-related morbidity. **METHODS:** Probabilities of therapeutic outcomes of medication therapy were estimated by an expert panel of pharmacists (N=29) using a two-round delphi-methodology and a conceptual model of drug-related morbidity based on a decision tree. We used an American conceptual model adjusted to the Swedish context. In the model, drug-related morbidity included new medical problems (adverse drug reactions, drug dependence and intoxications by overdose) and therapeutic failures (insufficient effects of medicines and morbidity due to untreated indication). The cost-of-illness analysis included all direct costs applying a health care perspective, using national statistics on costs. **RESULTS:** The expert panel estimated that 61±14% (mean ± SD) of all patients visiting health care suffered from drug-related morbidity, of which 29±8% suffered from new medical problems, 17±6% from therapeutic failures, and 14±7% from a combination of both types. Of patients with drug-related morbidity, 44±18% suffered from preventable drug-related morbidity. Participants estimated that 7-39% of patients with drug-related morbidity do not require further attention, but a majority requires health care resources due to the drug-related morbidity. The direct costs were calculated to EUR 575 (2009 value) per patient, which corresponds to an annual cost of EUR 4 billion to the Swedish health care system. The largest component in the COI of drug-related morbidity was hospitalizations, with 50% of the total cost. Advanced specialist care represented 20%, and prolonged hospital stay 11% of the resulting costs. **CONCLUSIONS:** Drug-related morbidity is perceived frequent and often preventable. The estimated health care costs for this morbidity are extensive, and comparable in magnitude to the cost of dispensed medicines in Sweden. Effective and cost-efficient methods to reduce the drug-related morbidity are needed.

PHP61

MODELING PHARMACEUTICAL COSTS IN PRIMARY HEALTH CARE ACCORDING TO CHRONIC CONDITIONS

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OBJECTIVES: Controlling pharmaceutical costs has been the subject of research and analysis in many studies in health economics which have shown that the chronic conditions of patients are an important factor. The present work models pharmaceutical expenditure by different health districts and gender according to the characteristics of chronic conditions. **METHODS:** An analysis was made of pharmaceutical expenditure between November 2008 and October 2009 of four health districts of the Autonomous Valencian Government, with an assigned population of 625,246. Those who had followed treatments for chronic conditions were identified associating the pharmaceutical groups (ATC codes) with 24 chronic conditions, according to electronic prescription data. Multivariate regression analysis was used, where the pharmaceutical expenditure in primary health care was explained through the gender, pharmaceutical co-payment status and the number of chronic conditions, varying from 1 to 8 or more. **RESULTS:** The percentage of patients with chronic conditions obtained was of 27.82%, who constituted 58.2% of the total pharmaceutical cost. Pharmaceutical co-payment status was excluded from the model due to its high correlation with the number of chronic conditions. The goodness of fit obtained for explaining the expenditure of the whole population was of 57.2%. The models obtained by health district explained between 56.5 and 60.6%, improving in the models obtained solely for the male population, where they reached 62% for one of the districts studied. Men's pharmaceutical expenditure was the 68.31% of women's. However, the number of chronic conditions has a greater impact on men's pharmaceutical expenditure than women's. **CONCLUSIONS:** Although for the whole population the proposed model explained the 57.2% of the pharmaceutical expenditure, differences can be observed between models obtained for each district or for gender. These models may be more suitable than the general model for cost management and establishing incentives for general practitioners in the different districts.

PHP62

ESTABLISH DRUGS OPTIMAL PURCHASE MODEL

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OBJECTIVES: Taipei Medical University Shuang-Ho Hospital officially opened on July 1, 2008. Due to limited revenue during the initial period, hospital emphasized more on cost control. With the great demand of medication from the growing numbers of outpatients visits and inpatients, pharmacy aim to establish an optimal purchase model to minimize drug inventory management cost. **METHODS:** Economic Order Quantity (EOQ) model were applied to find out the best quantity and frequency on medication purchase order. We analyzed the high-cost medications in which the top 50% of cumulative drug cost in year 2010, and intravenous antineoplastic drugs were excluded. **RESULTS:** The study evaluate drug cost, labor cost and inventory cost. Forty-six high-cost medications were selected to determine EOQ model in this study. The optimal frequency to order each drug estimated by EOQ model was three to ten times per month. The estimated cost of inventory management reduced substantially when order more frequently within 10 times a month. However, after considering the practicability in real practice, the order frequency was adjusted to one to four times per month. The best estimated quantity for each drug was also adjusted by previous fluctuation of purchase orders during 2010. Therefore, the estimated inventory management cost in year 2011 could reduce 500,000 to 700,000 NTD **CONCLUSIONS:** Our inventory management currently purchase drug twice a month. In order to optimize inventory turnover rate, without increasing pharmacists work loading and management cost, we recommend adjusting quantity and frequency of ordering medication based on our finding to achieve the minimal and rational cost on inventory management.

PHP63

SAVINGS ON PHARMACEUTICAL EXPENDITURE IN GREEK NHS HOSPITALS UNDER THE SHADOW OF THE INTERNATIONAL MONETARY FUND (IMF)

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Due to the financial crisis, Greece was forced by the International Monetary Fund and the European Community (Troika) to implement cost containment measures in the health care sector. **OBJECTIVES:** The objective of the study is to present the measures taken in order to control and reduce the pharmaceutical expenditure in all NHS hospitals and evaluate the respective savings emerging in 2010. **METHODS:** The data derive from the Ministry of Health and Social Solidarity (MoH) database, covering all NHS & IKA hospitals operating in the 7 Regional Health Authorities (RHA) of Greece. Data compare the NHS hospital pharmaceutical expenditure between 2009 and 2010. **RESULTS:** Numerous cost-containment measures have been gradually implemented in all NHS hospitals according to the IMF and MoH guidance, targeting at: 1)creation of NHS database network (esy.net); 2)transfer of the pharmaceutical pricing regulation from the Ministry of commerce to the MoH; 3)unification of the NHS electronic coding system, for ordering and prescribing of pharmaceuticals; 4)hospital packsize; 5)electronic patients files; and 6)increase in the use/penetration of generics & off patent medicines. Although the above measures are still not fully implemented, they reduced hospital pharmaceutical expenditure by 10.51%, from €1.466 million in 2009 to €1.312 million in 2010. At regional level, savings ranged from 8% in the 2nd RHA (covering Pireaus & islands) up to 16% in 6th RHA (Peloponnese & Western Greece). Moreover, in the 1st RHA covering the highest share of NHS hospitals of pharmaceutical expenditure was reduced by 15%. **CONCLUSIONS:** The new cost containment measures implemented in Greek NHS hospitals started presenting results by fulfilling the savings imposed by IMF & Troika). The same picture is presented in the overall HC sector, hospitals & social security funds. The goal of €350million savings by the NHS hospitals seems to be able to be achieved by the end of 2011.

PHP64

REORGANISATION OF HOSPITAL EMERGENCY SERVICES: A BUSINESS CASE FOR QUALITY IMPROVEMENT

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OBJECTIVES: In Switzerland, emergency care has no gatekeeping system and emergency wards are increasingly overcrowded by walk-in patients. This leads to inefficient use of spezialised resources. Treatment costs are paid by public sources and, beyond some co-payment, reimbursed by health care insurances via tariffs. Given the problems above, a public hospital (Stadtspital Waid; Zurich; catchment population 180'000 people) reorganised its emergency service in 2008. A nurse led triage system and a General Practitioner-led emergency service was implemented beside the conventional emergency ward. To better understand the impact, we assessed quality of service provision and total treatment costs. **METHODS:** From the public payer perspective, we compared annual treatment costs for ambulatory emergency care in 2007 with 2009. In a pre-post study, all consecutive ambulatory emergency patients were included during one month in each year. Treatment costs (CHF) were calculated (e.g. nursing time multiplied with wages) and extrapolated to one year. Waiting times and patient satisfaction were used as indicators for service quality. Clinical outcome was not directly measured. **RESULTS:** The annual number of ambulatory patients increased from n=10'440 (2007) to n=16'035 (2009). Service provision improved with reduced waiting times (mean: 120 min vs. 60 min), persistently high patient satisfaction and more efficient resource use (additional diagnostic testing: 71% vs. 56%). Comparison of the annual local budget spent for